

Publications of the

BRITISH FIRE PREVENTION COMMITTEE.—No. 5.

Edited by Edwin O. Sachs.

THE
NEW YORK FIRE DEPARTMENT.

A Paper

BY

HUGH BONNER,

CHIEF OFFICER.

WITH

Illustrations.

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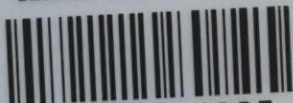


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PUBLICATIONS
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BRITISH FIRE PREVENTION COMMITTEE:

- No. 1.—WHAT IS FIRE PROTECTION ?
- No. 2.—AMERICAN OPINIONS ON FIRE PREVENTION.
- No. 3.—THE PARIS BAZAAR FIRE.
- No. 4.—THEATRE EXITS.
- No. 5.—THE NEW YORK FIRE DEPARTMENT.

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NOTE.

SINCE the great Cripplegate Fire, public attention has been largely directed to the general organisation, methods and appliances of American Fire Brigades, and the establishments at New York and Chicago have been frequently referred to.

When reference has been made in this country to American Fire Brigades, the fact seems, however, to have been overlooked that these establishments influence to a large extent the prevention of fire, irrespective of their attendance at actual conflagrations.

It is in order, in the first place, to be able to present a reliable description of the New York Fire Brigade by its eminent Chief Officer, that it has been decided to publish this Paper, but at the same time, particular attention is called to those lines where the author, in a few words, clearly indicates some of the functions which fall to the lot of his department with regard to the prevention of outbreaks. We should note how to each section of his force is allotted a district of the city for which the Officer in charge is responsible, to the extent of having to superintend the enforcement of certain laws relative to the prevention of fires, the storage and sale of explosives and combustibles, alterations in buildings, exits, etc., iron shutters, obstructions to fire escapes, and even the condition of the streets and avenues. Those few lines distinctly show how much a fire brigade organised to meet modern requirements may be able to do in preventing an outbreak.

There is no necessity to remark on any of the special features of this article, excepting perhaps to emphasise the great importance which the author attaches to the various installations used in calling an alarm of fire, and the details connected with the turn-out or concentration of engines. The law of New York, by-the-bye, enforces the fixing of alarm-points to hotels, public institutions, and other important buildings particularly prone to fire risk, and many warehouses are also connected with the Fire Brigade.

In conclusion, I would say that the Committee has to thank the editor of the "Engineering Magazine," of New York for the permission to print this article, which was originally written for that journal. The courteous way in which the editor of the "Engineering Magazine" has assisted the Committee in this matter, is one of those particularly pleasant features which has marked the relations of this Committee with those interested in fire prevention on the other side of the Atlantic. The "Engineering Magazine," it should be added, takes a leading position among American journals in respect to its treatment of questions of fire protection, having for many years called attention to the serious nature of modern fire risks, and the various problems which have to be taken into consideration.

EDWIN O. SACHS.

London,

March 30th, 1898.

THE

NEW YORK FIRE DEPARTMENT.

THE occurrence of a great city fire is usually, and not unnaturally, productive of the keenest interest and the most active discussion, often continuing long after new structures have risen upon the ruins of the old ones.

The property interests involved are so large, and the menace to life so great from fire in thickly-built districts, that attention is deservedly drawn to two great systems of safeguarding: first, systems of architectural construction which will make it extremely difficult for a building to take fire, or, if fire be started, to burn with rapidity; second, the most carefully organized and highly efficient system of confining and extinguishing a fire.

European cities are generally distinguished—strikingly so to an American—by the development of the former principle. In the United States, on the other hand, the chief dependence in most cases is now, and for some time must be, the efficiency of the fire department. While the heavy insurance losses on American risks and the proportionately high rates which are general, in spite of the highest organization of the protective service, suggest that prevention should coöperate with control, the recent great disaster in London has awakened active interest in the maintenance of a fire-fighting force which shall be adequate to any emergency arising in the largest cities.

It will be of interest, therefore, to study the system of organization and equipment of a typical American fire-brigade, and I shall take for an example the fire department of New York, as it existed at the end of 1897.

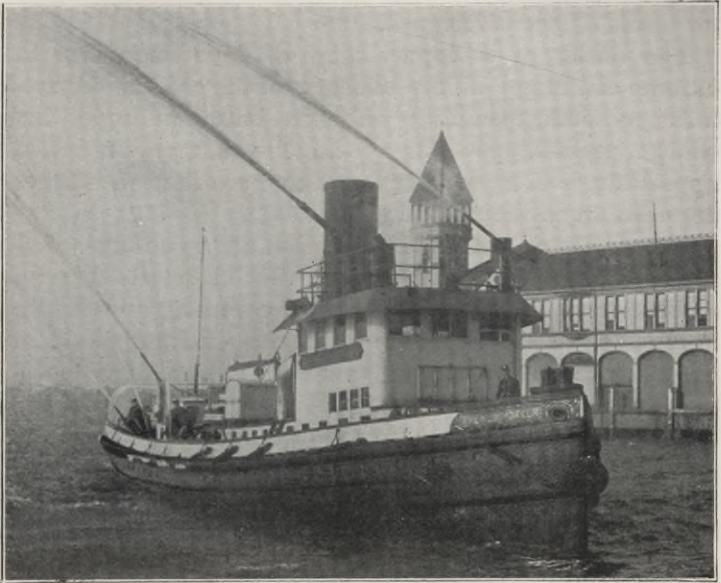
The fire-department of the city of New York has an aggregate of 1,146 officers and men, divided into 61 engine companies, on land, 3 companies on fire-boats, and 22 hook and ladder companies, a total of 86 companies. The number of men assigned to each varies with the



A THREE-HORSE FIRE ENGINE.

locality, but does not exceed a total of 12 (including two officers and two engineers) except in nine engine companies, which are classed as double companies, with the necessary complement of men to operate two sets of apparatus. Each section of these double companies is really a company in itself, and, in the absence of one section the other performs duty in the territory thus left vacant. The same conditions apply to one hook and

ladder company, which has a double set of apparatus, officers, and men, the second section being classed the same as the second section of a double engine company, and either assigned to cover the ground during the absence of a regular company, or held in reserve during large fires. Attached to some of the hook and ladder companies are chemical engines, which operate in the districts of the hook and ladder companies, but have an extra force in charge of them.



THE FIRE BOAT "NEW YORKER."

The department is divided into fourteen battalions, with from five to eight companies in each. The battalions are again sub-divided into three sections, and assigned to the command of a deputy chief of department, the whole force being under the direct command of the chief of department. The uniformed force consists of the following officers: chief of department, three deputy chiefs of department, one

chief instructor, fourteen chiefs of battalion, eighty-six foremen, ninety-six assistant foremen, and the necessary complement of engineers—two to each company, except in the double companies, each of which has four.

The chief of department is directly responsible for the management and discipline of the entire uniformed force and for the extinguishment of fires, and in turn is responsible to the board of fire commissioners, which body consists of three citizens, appointed by the mayor, for terms of six years each.

The duties of a deputy chief of department are to assume command in the absence of the chief of department, enforce discipline in each battalion under his charge, make inspections of the officers, men, uniforms, apparatus, horses, quarters, etc., and see that all officers are efficient in their duties.

The duties of a chief of battalion are to assume command of his battalion, regulate all the details therein, enforce discipline, visit the several company quarters in his battalion district, supervise the extinguishing of fires at which he arrives first, and forward to headquarters each morning all official papers, reports of operations at fires, etc., through the headquarters of the deputy chief to whose district the battalion belongs.

Each company has a foreman and an assistant foreman. The former is the officer in command, and is responsible for the control of his men, uniforms, discipline, etc., as well as horses, apparatus, tools, implements, and public property of all kinds entrusted to his care. He makes a return of this property annually to headquarters, and a proper record is kept. To each company is allotted a section of the city, which is classed as a company district, and for which the commanding officer is responsible. He is required to see, so far as details are concerned, to the enforcement of all laws relative to prevention of fires, storage and sale of explosives and combustibles, alterations

in buildings, exits and entrances, iron shutters, the care and condition of hydrants, obstructions to fire-escapes and their condition, the condition of streets and avenues, and every matter pertaining to the fire department. If it is not within the power of the commanding officer to correct any existing evil, he must immediately take action by forwarding the necessary reports to headquarters, with a view of abating or remedying the evil at the earliest moment. He is also required to make a

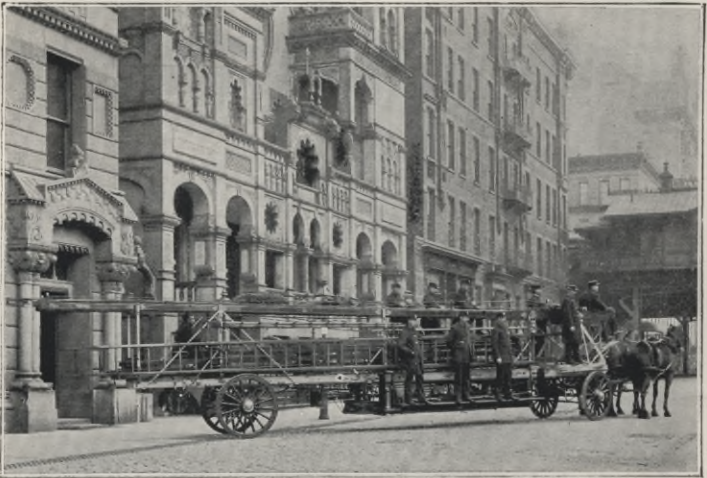


A TWO-HORSE FIRE-ENGINE.

report each morning after roll-call at 8 o'clock A.M., and to transmit the same to his battalion chief, showing the exact number of men ready for duty, those who are absent and for what cause, reports of operations at fires, etc.; and these are in turn transmitted to the deputy chief of department, and by him to the chief of department at headquarters, where all such reports are consolidated and a record kept for future reference.

Engine companies are equipped with engines of a

capacity of from 350 to 1,100 gallons per minute. The heavier engines are arranged to operate with three horses, and weigh, when ready for use, about 11,000 pounds; those of smaller size are usually located in the suburban district, do not weigh, when ready for use, more than 5,500 pounds, and, as a rule, are equipped with two horses. The engines are complete in every respect, and, while standing in quarters, are connected to a heater in the cellar, which permits a circulation between the two boilers, with the object of keeping on the engine



HAYES HOOK AND LADDER TRUCK WITH EXTENSION LADDERS.

boiler from 5 to 25 pounds of steam, which is necessary in all cases to give a prompt water-supply at fires in the vicinity of company quarters. The engines have tool-boxes containing all the tools used on pumps, machinery and boilers. Ash pans with space sufficient to carry fuel for an hour's duty are on the back of each engine.

Hose wagons are drawn by two horses, and are equipped with 1,500 feet of hose, a section of large tapering hose, two scaling ladders, life lines, life belts, life gun, life net, roof rope, wrenches, siamese, pipes,

nozzles, and hose hoisters. The hose varies in size from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches in diameter. Hose wagons of the first size attached to engine companies carry 1,000 feet of 3-inch hose, 500 feet of $2\frac{1}{2}$ -inch hose, and 600 feet of



THE HAYES TRUCK, WITH LADDER EXTENDED.

$1\frac{1}{2}$ -inch hose. The small hose is generally used at small fires, while the 3-inch hose is used on larger fires, or where more than one alarm is necessary. The wagon

carries all the men, and follows the engine to the scene of the fire. The hose wagons are supplied



SCALING LADDERS, AS USED AT NEW YORK.

with rubber hose and rubber-lined cotton-hose, and, after use at a fire, the wet hose is replaced by dry.

A hook and ladder truck of the first size is equipped with an 85-foot extension ladder, carried on a frame, with the butt resting on a turntable; the ladder is elevated by the use of cranks on each side. An aerial ladder can be elevated to a height of 85 feet in about one minute. The other ladders vary in length from 10 to 50 feet. The truck is also equipped with scaling ladders, life lines, life belts, tools and implements, such as hooks, axes, mauls, augers, saws, hammers, cellar and sub-cellar pipe, spherical nozzles, two-way siamese, four-way



HOSE WAGON, CARRYING SCALING LADDERS.

siamese, $3\frac{1}{4}$ inch hose-pipes, nozzles, roof lines, hose hoisters, ball and chain, battering ram, door-opener, wall-cutter, tin-cutter, life gun, rope ladders, claw irons, tapering hose, and fire extinguishers.

Chemical engines, which in a number of cases are in use with hook and ladder companies, are drawn by two horses, and carry two sixty-gallon tanks of fluid, resting on an iron frame. When equipped and loaded, they weigh about 5,000 pounds, and are made ready for use, when they arrive at fires, by turning the sulphuric acid

carried in a jar inside of the tank. The acid, when mixed with the soda, generates a pressure in the tank which forces the fluid through a small hose, and throws it on the fire. The water thus charged with carbonic acid gas is highly efficient in holding in check and extinguishing a fire of considerable magnitude. The chemical engines are generally used in dwelling or suburban districts, or in districts where the water-supply is scarce, or where there are not enough engines to cover the district.

Three water towers are used in conjunction with the hook and ladder companies, and are operated by an extra force of men assigned to those companies. The towers are drawn by three horses, and are constructed to receive from two to six streams of water on each side of the frame. These streams are discharged into a reservoir, and then through a $3\frac{1}{2}$ -inch hose, which passes through an iron frame about 25 feet in height, and which is elevated to a perpendicular position by water pressure. There is also a 50-foot extension piece, which operates within this frame.

The streams thrown by the water tower vary in size according to the supply furnished to the reservoir, depending for this on the number of engines which can be spared for this duty. The object of this standpipe is mainly to operate in the upper part of the building; for such a situation, it affords a convenient and efficient means by which great quantities of water can be discharged when the extent of the fire warrants it. There is also a deck pipe attached to these towers, about six feet in height, connected to a similar reservoir, and fed in a like manner; it is operated from the deck of the tower by the use of a lever. Streams from this pipe can be utilized in the cellar, the top floor of a building, or may be directed toward any point of the compass, and are mainly used on the lower floors directly under the streams from the stand-pipe.

The fire boats are three in number, with capacities of

2,500, 3,500, and 13,000 gallons per minute, and are located on the East and North rivers, and at the Battery, and perform duty on the river-fronts in protecting the large piers and shipping, as well as on land to a distance of 1,000 feet from the bulkhead line. They are equipped with hose $2\frac{1}{2}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, 4, 5, and 6 inches in diameter; there are swivel nozzles on deck and on top of the pilot house, and discharge gates on pumps from sides and fore and aft, with the necessary complement of pipes,



ONE OF THE CHEMICAL FIRE ENGINES.

nozzles, and wrenches for all sizes of hose. Two of these boats have hulls and upper bulwarks of steel, and are fully capable of entering any bulkhead or side of a pier, no matter how hot the fire. They are intended for such emergencies, as well as for removing burning vessels from their berths and hauling them to places of safety.

The boats often receive alarms for fire on shipboard, from vessels that have reached the Highland Lights, going to, or returning from, sea voyages; they go to

meet the vessels, and take entire charge of the extinguishment of the fire before the vessels reach their docks. The boats are also available for duty on either shore, when called for by the authorities. They are manned by one foreman, one assistant foreman, three engineers, two pilots, three stokers, and eight firemen.

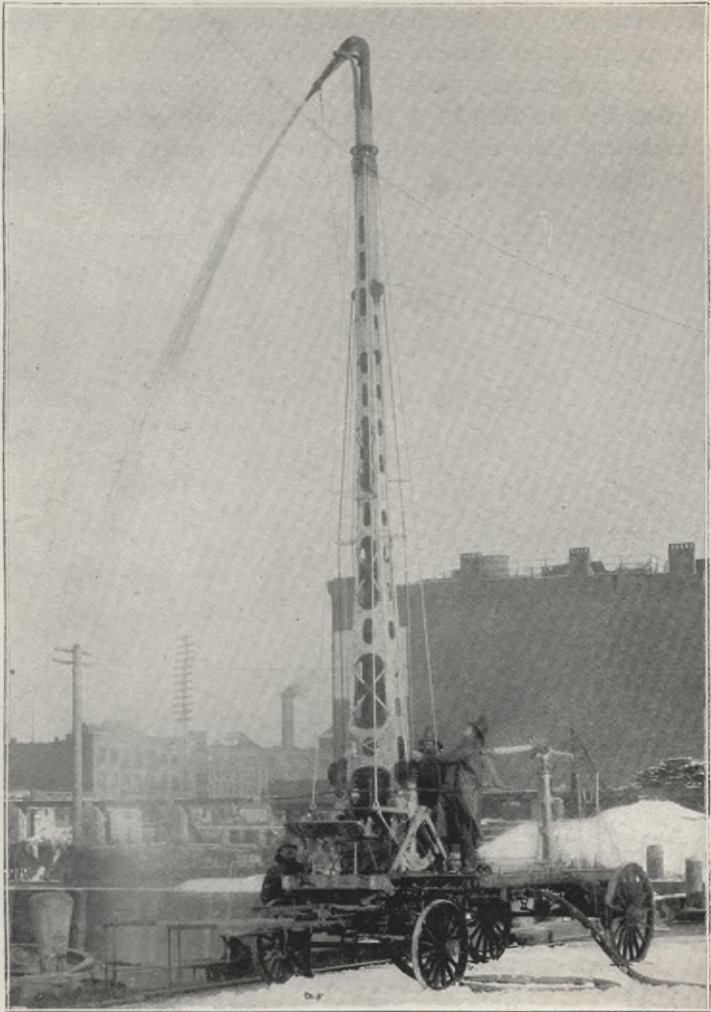
The fire-alarm system receives at the central office all alarms from the various boxes or stations, which are marked by a red lamp. The alarm box is attached to



THE WATER TOWER, LOWERED FOR MOVEMENT THROUGH THE STREETS.

the lamp-post, and has a keyless door. On its face is a brass knob; also its number. Turning of the knob operates an automatic gong in the door, which announces to those in the vicinity that the box is being opened. From the front of the inner box a hook projects, and the pulling down of this hook once and letting it go starts the machinery in the inner box, and registers at the central office the number indicated on the face of the box. This number is immediately re-transmitted from the central office by a repeating instrument, which

transmits the signal over the various circuits to the com-



THE WATER TOWER, RAISED AND IN OPERATION.

panies which are to respond, as shown in the table on page 21.

The inner box contains a Morse key, a small armature, and a small gong. The Morse key is used when additional help is required, after the arrival of the first company at the scene of a fire. The officer in charge, if, in his judgment, additional companies are required, directs the sending of a second alarm, which is sent by Morse key from the box to the central office, the signal 2-2 being followed, say, by Station 8 6, which indicates



MANNER OF USING THE LIFE NET.

that all the companies on the second line for station 8 6 are to go to that station. Should still further help be required, a third alarm is sent, the signal 3-3 being followed by station 8 6. The 4-4 and 5-5 alarms are sent similarly. Then, if additional help is still required, the simultaneous call 9-9, station 8 6, 3-3,-3 7 9, is sent. This will bring all the companies assigned to the station at Broadway and Twenty-fifth street on the third alarm

STATIONS.	Engine Cos.	H. & L. Cos.	Deputy Chief of Depart.	Chief of Batta'ln	Tower	Company to Supply Fuel.	From Fuel Depot.	Companies to Change Locations.	RESERVE FORCE.		
									Engine Cos.	H. & L. Cos.	Ch'fs. of Batta'ln
84	27, 31, 7 29, 12, 30, 13, 9 55, 6, 4, 32, 20, 24	8, 1 10 20, 9	L	2, 1 5 3	1	Eng. 27 " 29 " 55	No. 3 " 2 " 6	..... ..... E. 33 to E. 7; H. 5 to H. 1	27, 31 12, 10	15 6	4 6
* West Broadway and Worth St.											
85	7, 31, 27 29, 12, 6, 4 9, 13, 55, 32, 30	1, 8 10 20	L	2, 1 5 3	1	Eng. 7 " 29 " 9	No. 3 " 2 " 6	..... ..... E. 33 to E. 7; H. 5 to H. 1	31, 27 12, 10	15 6	4 6
* Church and Duane St.											
86	31, 7, 12 27, 29, 9, 55, 4 6, 32, 13, 20, 33, 30 24, 17, 15, 10, 11, 25 18, 28, 5, 14, 3	1, 8 10 20 9 5	L	2, 1 3 5 4	1	Eng. 31 " 27 " 6	No. 2 " 3 " 6	..... ..... E. 13 to E. 7; H. 5 to H. 1 E. 18 to E. 55; H. 18 to H. 20 E. 5 to E. 17; E. 16 to E. 14	31, 12 27, 33	3 6	6 7
* Broadway and Thomas St.											
87	7, 31, 12 27, 9, 55, 29 4, 32, 6, 20, 13	1, 10 8 6	L	2, 1 3 5	1	Eng. 7 " 27 " 4	No. 2 " 3 " 5	..... ..... E. 33 to E. 7; H. 5 to H. 1	31, 12 27, 10	20 15	4 6
* Duane and Elm St.											
88	7, 31, 12 9, 27, 55, 29 4, 32, 20, 6, 17	1, 8 10 6	L	2, 1 3 5	1	Eng. 7 " 9 " 4	No. 2 " 3 " 5	..... ..... E. 33 to E. 7; H. 5 to H. 1	31, 12 27, 13	20 15	4 6
* Centre near Pearl St.											

TABLE ILLUSTRATING ASSIGNMENT OF COMPANIES, AND THEIR MOVEMENT ON FIRST AND LATER ALARMS.

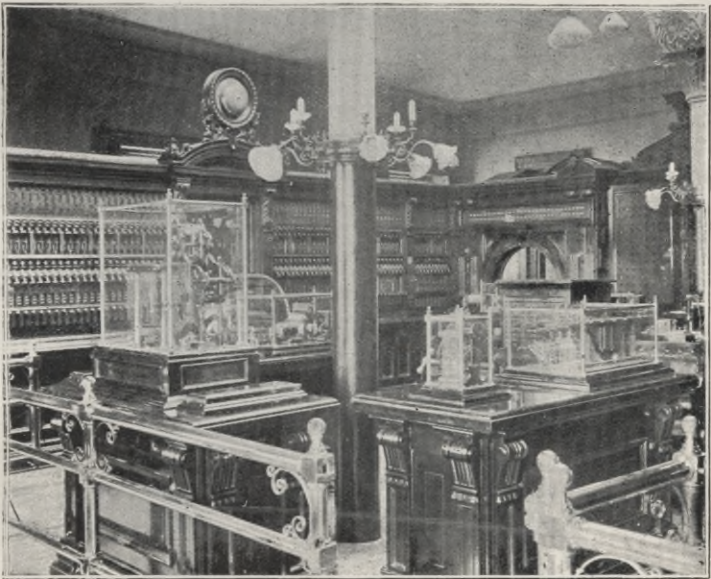
to Worth street and Broadway, and the same course may be pursued in any section of the city where the companies are still in quarters. Companies may also be called singly by the special call signal system. When all the companies are called by the fifth alarm for station 8 6 and are on duty, the city is still protected by reserve companies, as well as those moving to various quarters. For instance, the order E. 13 to E. 7, means that second section of Engine 13, at Wooster and Spring streets, shall proceed to quarters of Engine Company 7, at Chambers and Centre streets, and cover the ground left vacant by the absence of Engine Company 7 at the fire. The order H. 5 to H. 1, means that the second section of H. & L. Co. 5 shall go to the quarters of H. & L. Co. 1, Chambers and Centre streets, and cover the district left vacant. In this manner the outlying companies are gradually brought closer to the scene of large fires, so that, in the event of one or more fires at the same time, the city as a whole has protection by the use of the reserve sections, which, as a rule, are not used at the first fire, but are held in reserve.

In addition to the street boxes, there are a number of special boxes in public institutions, theatres, hotels, academies, colleges and schools, which are in direct communication with the central office. An alarm from one of these boxes calls to the building two or more companies and a chief officer. The central office is also connected by automatic signals with a great number of mercantile houses. The law requires that public buildings, institutions, hotels, apartment-houses, colleges, etc., shall be connected with an alarm system in direct communication with the central office.

The fire alarm system south of One Hundred and Tenth street, with few exceptions, is entirely underground, the department having for its use separate conduits in the underground system. From these conduits special lines are laid to the various boxes and engine-houses throughout the city, so that, in the event

of a gale or severe snow-storm, the underground system can be relied upon in transmitting alarms.

The companies are assigned in the regular order of distance from their quarters to the locality indicated. If from any cause they should fail to arrive in such order, they are required, in forwarding their reports of operations to headquarters on the following morning, to state the cause of such failure, and also answer a set of questions. This is a record of the operations of the



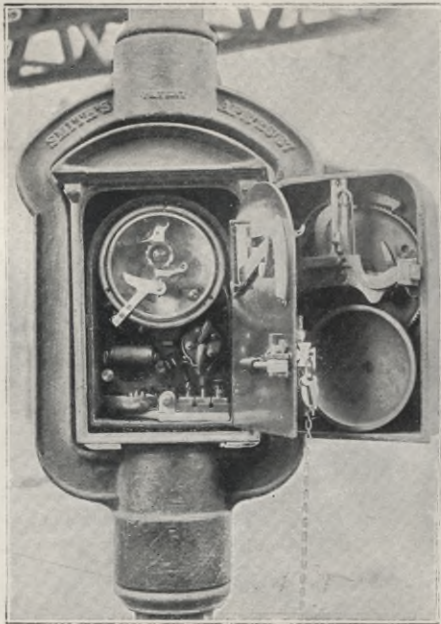
INTERIOR OF MAIN FIRE-TELEGRAPH OFFICE AT HEADQUARTERS, NEW YORK.

On the left, in the background, is the key-board, each key indicating a separate circuit, on which alarms are received. The smaller instruments on the centre tables are used for transmitting first alarms to the companies assigned for response to each box. The large instrument to the left is reserved for second, third, and special alarms. Opposite to the key-board is a switch-board (not shown), by which the circuits are constantly tested.

company, and is also a part of the records of the department. The action of every officer and man on duty at an alarm of fire is a matter of record, as well as the duties performed by the companies, and a copy is sent to the headquarters daily. The responsibility in

all cases commences with the first officer arriving, who must assume command of the fire until the arrival of a superior, who in a like manner assumes command until relieved by someone higher in authority.

The water is supplied by the reservoir system. Large conduits are run through the main avenues, and from these points distributed to the smaller mains throughout the city. To these smaller mains are connected the fire

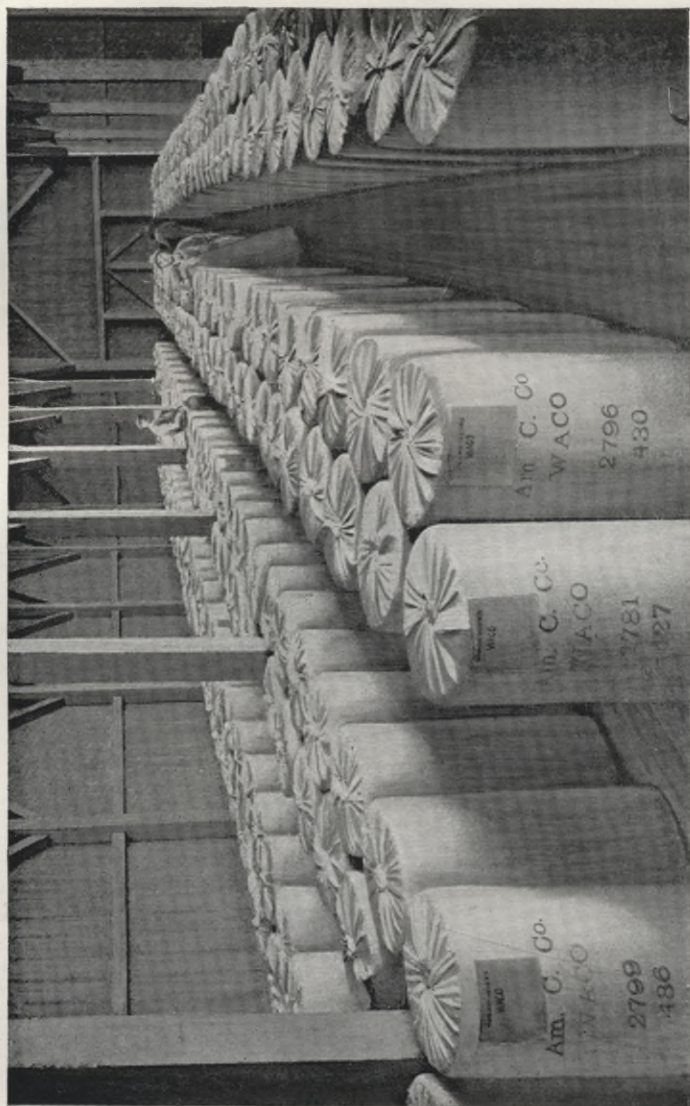


FIRE ALARM BOX WITH INNER DOOR OPEN.

hydrants which supply the engines with water. The hydrants are of several patterns. Those that are now being set for use are of an improved type, and very seldom freeze, being connected to a sewer which permits the superfluous water from the barrel to pass into the sewer after the valve is closed from the main. Those of the old pattern freeze every winter, so that the engineers, on arriving with their engines, have to open the hydrant

to see if it is frozen. If it is, the engineer immediately applies the thaw hose, connected to the boiler of the engine, and uses the steam and hot water from the boiler to thaw out the hydrant, which usually takes about five minutes. When the water is found, the connection is made, and the engine is ready to force water through the hose stretched from the engines to the fire. Many of the streets are still using the six-inch mains, which give a sufficient supply for an ordinary fire, but, when more than the usual number of companies are drawing water from this main, it is entirely inadequate. Many streets are supplied with mains from 12 to 48 inches in diameter, which obviate in a measure the defects of the smaller mains. In the districts where the larger pipes are located there is never a scarcity of water. Since the introduction of the new aqueduct, the supply has met every requirement, even at extraordinary fires.

Spare engines, with men, are detailed to thaw out all hydrants found frozen, and these hydrants are then salted, turning any water remaining in the barrel into a strong brine. This course is followed during each cold spell throughout the winter.



THE STORAGE OF "ROUND" BALES.